

Chapter 7

Diabetes and Kidney Disease in Alberta



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DIABETES AND KIDNEY DISEASE IN ALBERTA

KEY MESSAGES

- The rate of developing end-stage renal disease is 10 to 15 times greater in patients with diabetes compared to patients without diabetes.
- The average annual growth rate of incident end-stage renal disease in the diabetes population is more than double that of the non-diabetes population over the past decade.
- From 1997-2007, the proportion of end-stage renal disease patients with diabetes has increased from 39% to 51%.
- Declining trends in the age- and sex-adjusted incidence and prevalence of end-stage renal disease in people with diabetes has occurred over the last several years of observation.

BACKGROUND

One of the most serious consequences of diabetes mellitus (DM) is renal or kidney disease, also known as diabetic nephropathy. This frequently progresses to end-stage renal disease (ESRD), a state where life-sustaining treatment of ongoing dialysis therapy (either hemodialysis or peritoneal dialysis) or kidney transplantation is necessary. Patients with DM are at an increased risk of developing ESRD, up to 13 times greater than those without DM.⁽¹⁾

ESRD patients on dialysis have a very poor quality of life⁽²⁻⁵⁾ and high mortality rates, with 5-year survival rates of less than 30%,⁽²⁾ worse than many commonly occurring malignancies.⁽⁶⁾ While kidney transplantation is the preferred treatment, the limited availability of organs has led to very long waiting list times.

Those with diabetes and ESRD have even poorer health outcomes than non-DM patients receiving dialysis. In addition to reporting a much lower quality of life,⁽⁷⁾ persons with diabetes have significantly higher mortality. In Canada, DM as a cause of kidney failure strongly influences survival in adjusted analysis, increasing the risk of death almost two-fold.⁽⁸⁾ Finally, patients with ESRD and DM tend to have more comorbid illnesses, such as cardiovascular and peripheral vascular disease, which may preclude treatment with kidney transplantation.

Provision of care to the ESRD population is associated with significant consumption of health care resources. In developed nations, it is estimated that ESRD affects only 0.07% of the population, but consumes 2% to 3% of health care budgets.⁽⁹⁻¹²⁾

On a national level, the number of prevalent ESRD patients in Canada continues to grow at approximately 6% per annum,^(8,9,13) a rate which would be expected to result in a doubling of the ESRD population every 7 to 10 years. A significant contributor to the growth in ESRD patients is due to increased numbers of persons with DM. The proportion of persons who develop ESRD due to DM in Canada has increased from 25% to 35% from 1993-2005.⁽⁸⁾

Our objective was to describe the epidemiology of ESRD and kidney transplantation in Alberta, from 1997-2007, with specific emphasis on patients with DM.

METHODS

Data from Alberta Health and Wellness, which provides health care insurance to all permanent residents of Alberta (including Status Aboriginal people), was utilized for this analysis. This administrative dataset captures demographic information, outpatient and inpatient encounters, and physician billing claims. All adult patients 20 years or older were included in these analyses.

Physician billing claim codes specific for the delivery of maintenance dialysis therapy over the study period (1997-2007) were used to identify dialysis patients (see appendix). The patient population of interest were those receiving chronic dialysis, defined as having at least 2 dialysis billing codes in ≥ 90 days determined using physician billing claims. The start date of dialysis was defined by the date of the earliest dialysis billing claim.

New or incident dialysis patients for a given year were defined if they met the above criteria, and if their start date of dialysis occurred in that year, without having been a dialysis case in the previous year. A person identified as an incident dialysis patient in a given year would be classified as a prevalent dialysis patient in subsequent years if additional dialysis billing claims occurred in these years.

Kidney transplantation was identified by physician claims for the surgical procedure of kidney transplantation (see appendix).

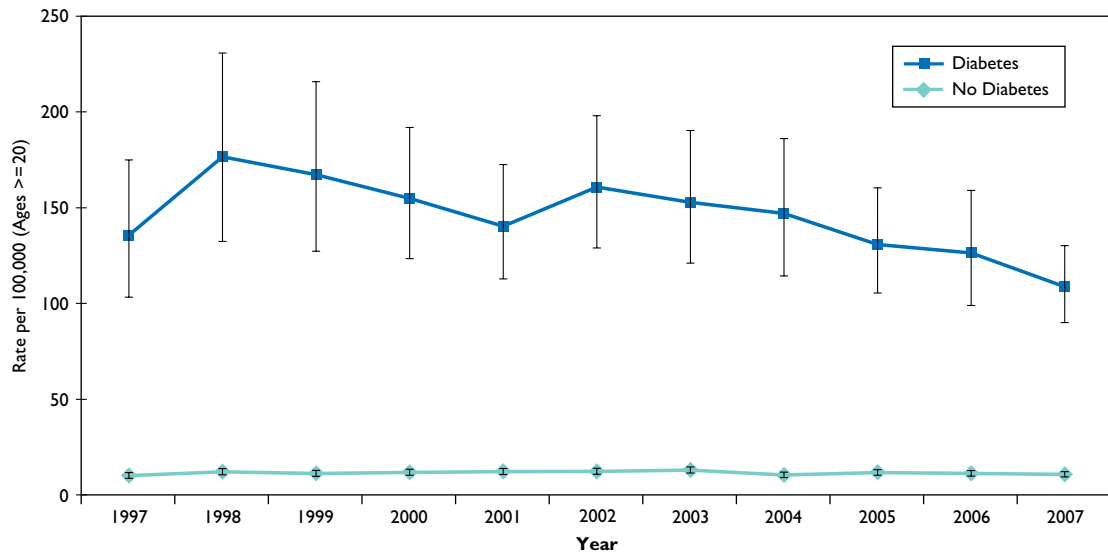
Persons with diabetes were identified as described in the “Background and Methods” chapter. DM and ESRD status of individuals were determined for each year, then incidence and prevalence rates of ESRD were calculated for persons with and without DM for each year. Age-specific rates for ESRD and kidney transplantation are also reported.

FINDINGS

Incidence

The age- and sex-adjusted rate of ESRD per 100,000 persons was relatively stable for persons without DM over the decade of observation; however, in those with diabetes an initially stable rate was followed by a declining trend in the last 5 years. The rate of developing ESRD for those with DM has been 10 to 15 times higher compared to those without DM (Figure 7.1).

Figure 7.1 Age- and Sex-Adjusted ESRD Incidence Rates, 1997-2007



The number of all incident ESRD cases per year increased from 297 to 494 over 10 years (Figure 7.2), with an average annual growth of 5.6%. Over the same time frame, the average annual incident ESRD growth for persons with DM was 8.4%, compared with 3.6% for those without DM. In 1997, 39% of all the incident ESRD cases had DM. This figure increased to 51% in 2007 (Figure 7.3).

Figure 7.2 Number of Incident ESRD Cases, 1997-2007

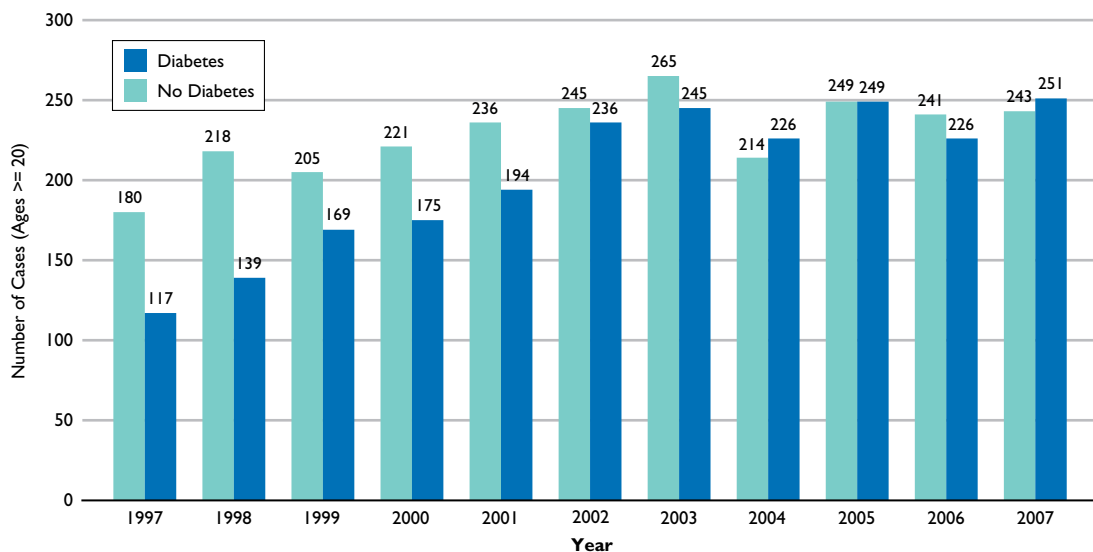
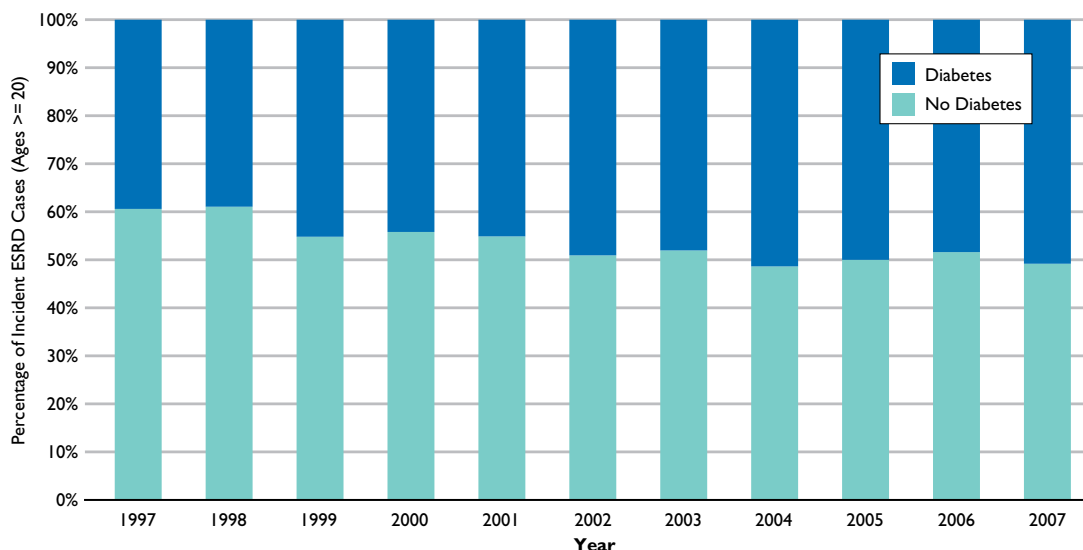


Figure 7.3 Percentage of Incident ESRD Cases, 1997-2007



In the year 2007, the 50-64, 65-74 and 75-plus age groups had the highest number of patients developing ESRD with DM, outnumbering new ESRD subjects without DM in each age group (Figure 7.4). The greatest average annual growth rate over the 11-year period of observation was in patients with DM in the oldest age group, with growth rates over two-fold greater than those without DM (Figure 7.5).

Figure 7.4 Age-Specific Incident ESRD Cases, 2007

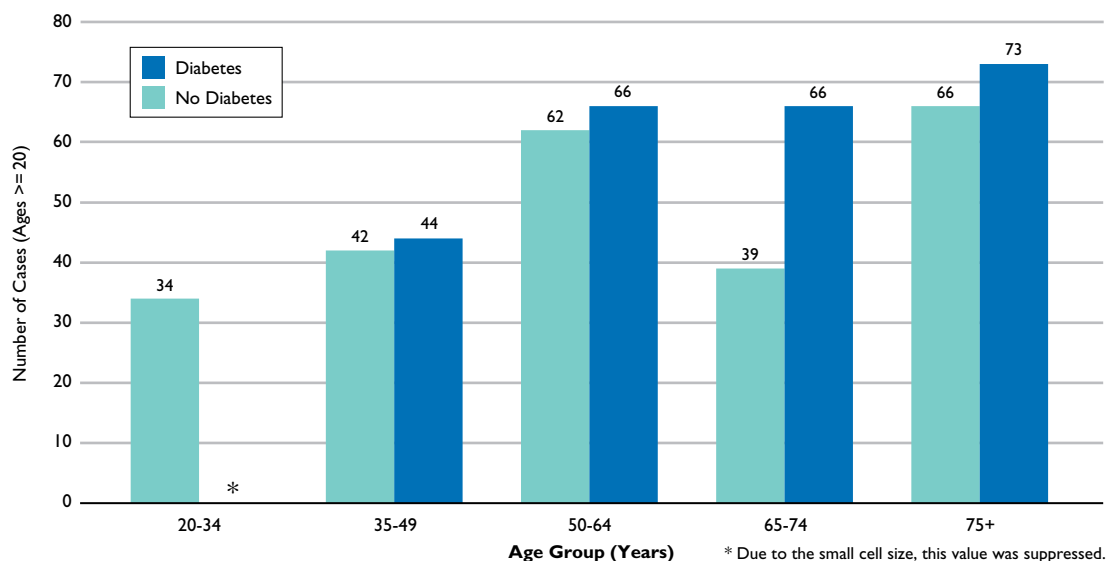
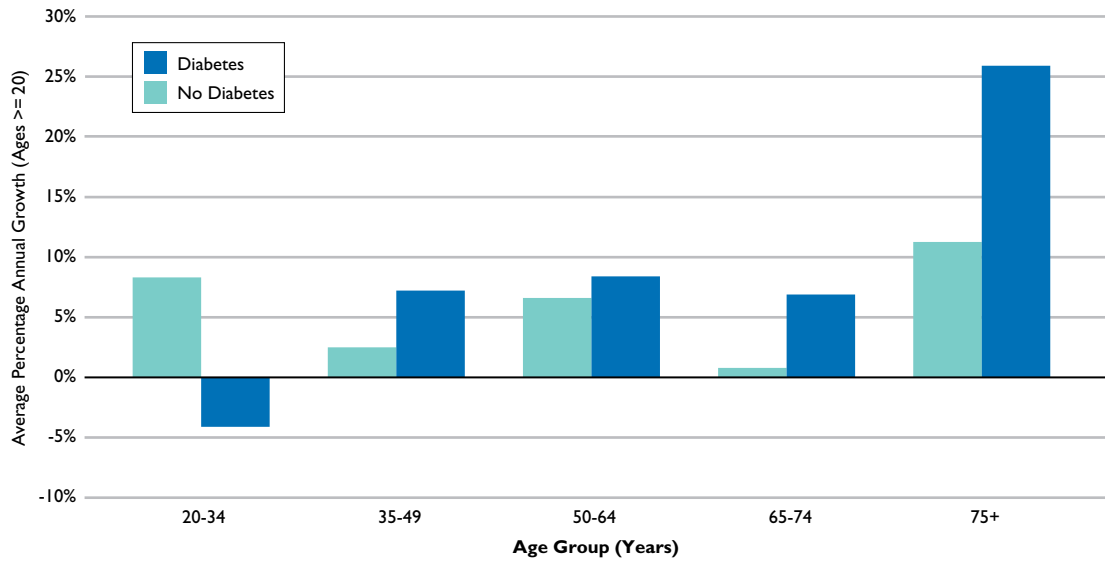


Figure 7.5 Average Annual Growth of Incident ESRD Cases, 1997-2007



Prevalence

The age- and sex-adjusted prevalence rate per 100,000 persons with ESRD requiring dialysis was 8 to 12 times higher for patients with DM compared with those without DM from the years 1997-2007 (Figure 7.6). The absolute number of patients with ESRD on dialysis increased from 1,010 to 1,921 from 1997-2007, with an annual average growth of 6.7% (Figure 7.7). The average annual growth rate for persons with DM and ESRD was 10.5%, compared with 4.1% for those with ESRD without DM. The proportion of patients with ESRD and DM also increased from 34% to 48% over the period of observation (Figure 7.8).

Figure 7.6 Age- and Sex-Adjusted ESRD Prevalence Rates, 1997-2007

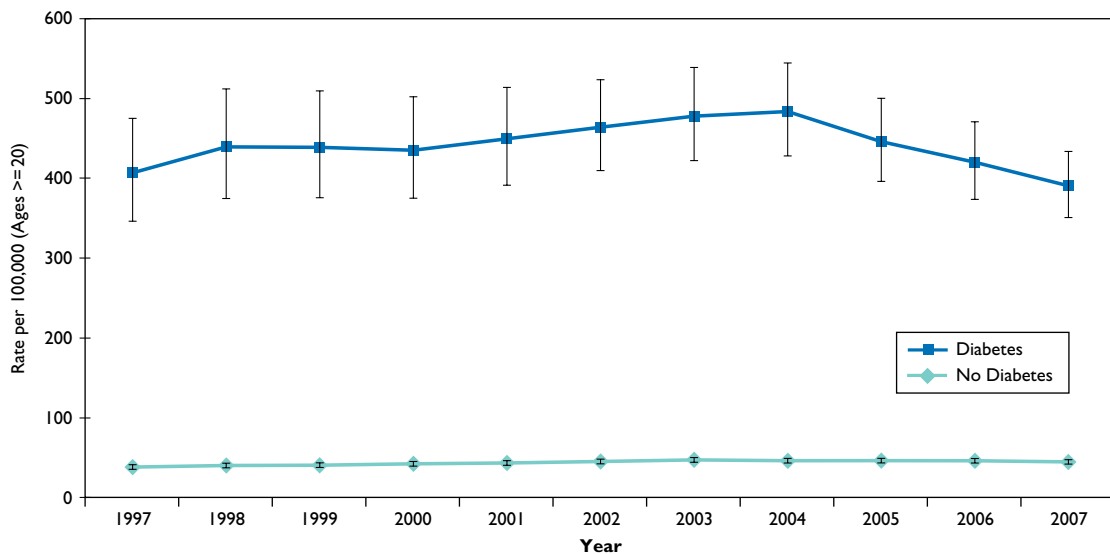


Figure 7.7 Number of Prevalent ESRD Cases, 1997-2007

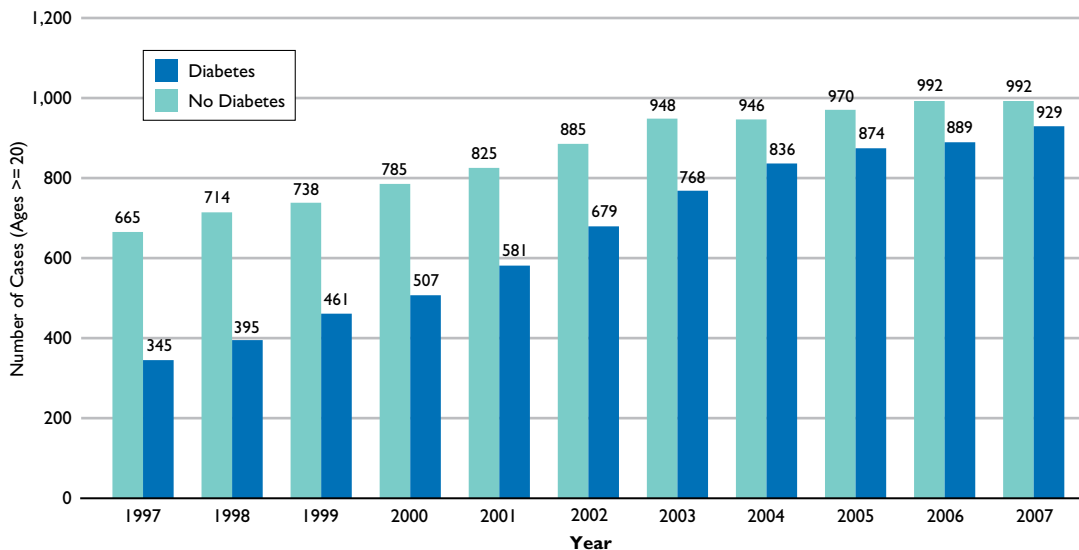
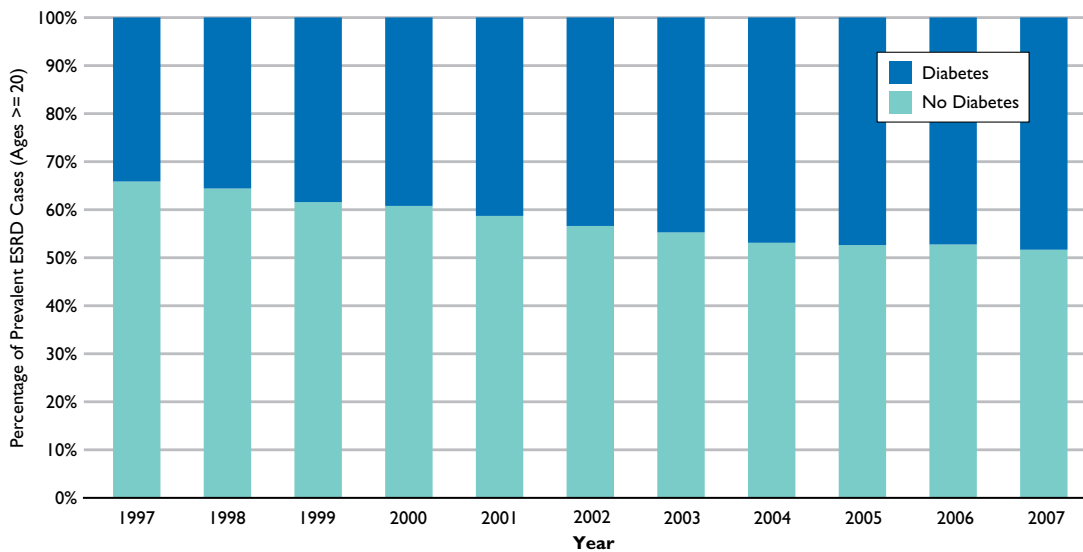


Figure 7.8 Percentage of Prevalent ESRD Cases, 1997-2007



Kidney Transplantation

Kidney transplantation was more common in patients under the age of 65 (Figure 7.9). Of all kidney transplants in a given calendar year, the fraction of persons with DM receiving a kidney transplant has remained relatively stable at 25% in 1995, and 28% in 2007 (Figure 7.10).

Figure 7.9 Age-Specific Kidney Transplantation Cases, 2007

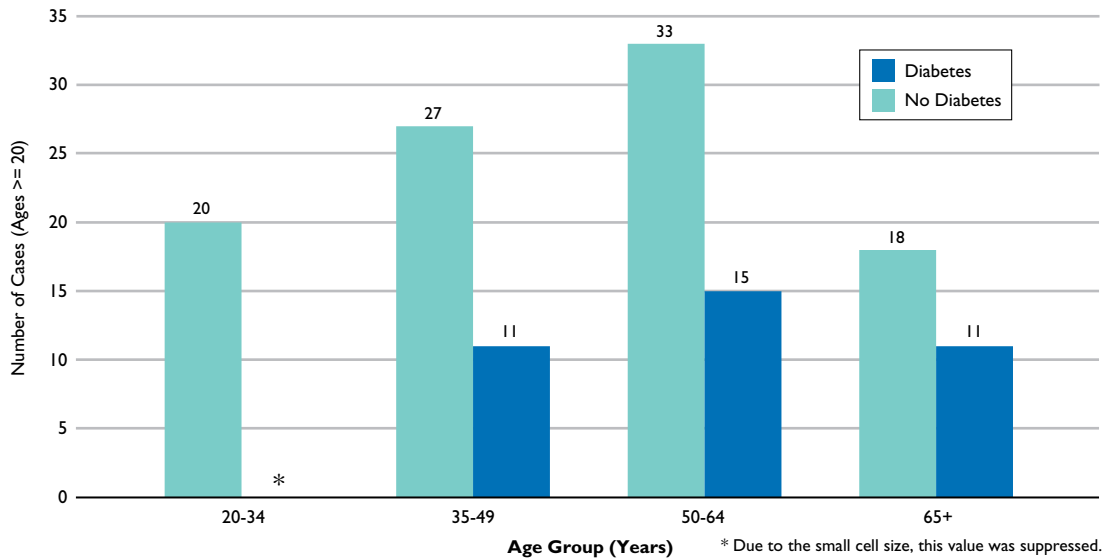
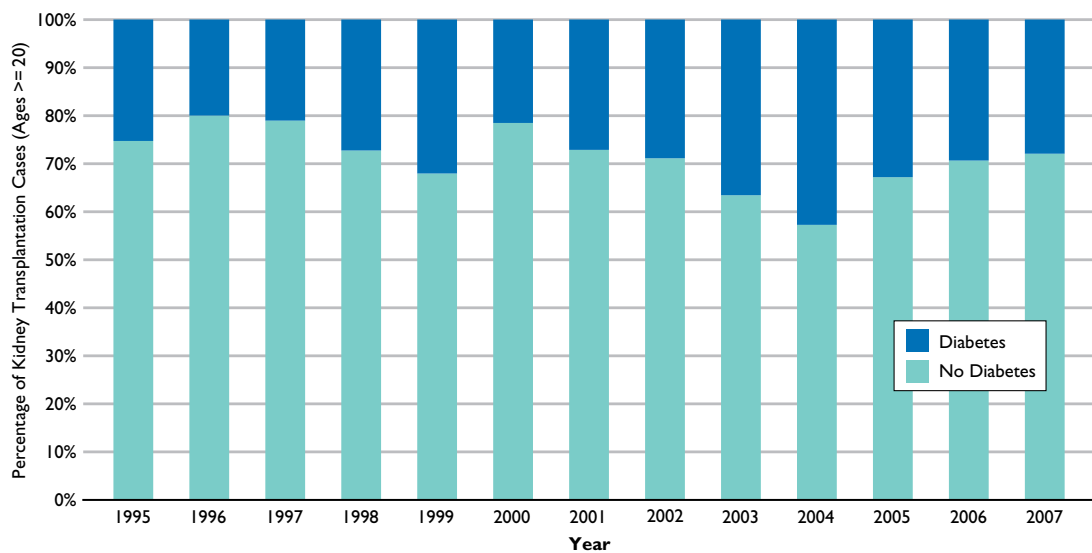


Figure 7.10 Percentage of Kidney Transplantation Cases, 1995-2007



DISCUSSION

Over the past decade, the number of patients with DM who developed ESRD annually, or who are currently receiving dialysis therapy in a given year, have increased substantially in Alberta. Patients with DM now account for half of the new and existing patients on dialysis, a potential concern given the poor outcomes commonly seen for these patients.

In addition, age groups 50 years and older have the highest number of patients with incident ESRD and DM; the greatest growth in incident ESRD is seen in those over the age of 75. The relative stability of incidence and prevalence rates when adjusted for age and sex suggest that this growth trend may not be due to a higher risk of developing ESRD in patients with DM, but instead may indicate that the number of persons with DM is increasing, which is supported by other data in this *Atlas* (see “Epidemiological Trends of Diabetes” chapter). Alternative and potentially complementary explanations are:

- 1) increases in life expectancy due to advances in medical treatment are allowing more people with diabetes to survive long enough to require and receive dialysis treatment;
- 2) physicians are more likely at present than in the past to refer elderly patients with diabetes for dialysis treatment; or,
- 3) improvements in dialysis technology currently allow patients with a heavy burden of disease (such as the elderly with DM) to successfully receive dialysis.

Therapy exists for patients with kidney complications of diabetes to delay or prevent the progression to ESRD. It is encouraging that the age- and sex-adjusted rates of incident cases of ESRD in those with DM appears to be declining, a trend noted in other jurisdictions. However, increasing the use of proven prevention strategies remain an important goal.¹⁴

While use of administrative data provides a population-based method of obtaining disease trends, it also has limitations. Given our definition of chronic dialysis, patients with ESRD who die within 90 days of initiation of treatment will not be captured. We also identified all patients with ESRD, although DM may not have been the cause of ESRD. Given limitations in data and billing codes, we were unable to differentiate between home-based compared to in-hospital dialysis. We also did not assess ESRD-related mortality because of small numbers.

While the fraction of persons with DM receiving a kidney transplant has increased slightly over the last decade, it does not appear to have kept pace with the increase of ESRD incidence in patients with DM. This may be due to various factors including decreased eligibility for kidney transplantation, due to concomitant comorbid illness or advanced age, and the greater risk of mortality while patients are on the transplant wait list. More research is needed to confirm these speculations.

In light of poor patient outcomes, high health care costs and continued growth in patient numbers, kidney disease due to diabetes is an emerging public health issue in Canada—and worldwide. Continued efforts to identify patients at risk and institute therapy to slow the progression of diabetic nephropathy to ESRD is warranted to attenuate the impact of this complication.

APPENDIX

Alberta Physician Claims Data

Procedure	Code	Description
Peritoneal dialysis	I3.99C	Assessment and management of an unstable patient with acute/chronic renal failure treated by peritoneal dialysis
	I3.99D	Assessment and management of a stable patient with chronic renal failure treated by peritoneal dialysis
Hemodialysis	I3.99A	Hemodialysis treatment, unstable patient
	I3.99B	Hemodialysis treatment, stable patient
Home based or satellite therapy	I3.99O	Management of dialysis patients on home dialysis or receiving treatment in a remote hemodialysis unit (per week)
Kidney Transplantation	67.59A	Renal transplant (homo, hetero, auto)

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